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Crystal field simulation and NMR study of 19F in a EuF3 Van Vleck paramagnet

Savinkov A., Dooglav A., Malkin B., Tagirov M., Korableva S.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015 AIP Publishing LLC. The temperature dependence of the nuclear spin-lattice relaxation rate of 19F nuclei is measured for a powder sample of a EuF3 Van Vleck paramagnet, in a broad temperature range (55-300K). The increase in the nuclear relaxation rate observed at T < 100K is caused by fluctuations in the magnetic fields, induced at the fluorine nuclei by the magnetic moments of the europium ions, the lifetime of which is determined by a two-phonon relaxation process with input from the first excited state of the electron shell of Eu3+ ions (Δ1=?370K). The set of crystal field parameters allowing for a satisfactory description of the electron energy spectrum of the Eu3+ ions in the EuF3 crystal, is calculated within the framework of the semi-phenomenological exchange charge model.

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